Carbaryl Executive Summary for ESA Assessment

This Biological Evaluation (BE) assesses whether the registered uses of carbaryl (PC code 056801), based on the U.S. Environmental Protection Agency's (EPA) proposed federal action, will result in a potential effect to an individual of an endangered and threatened (listed) species and/or designated critical habitats. The evaluation also includes analysis of impacts to candidate species as well as species and critical habitats proposed for listing for conferencing purposes under section 7 of the Endangered Species Act (ESA).

[redacted]

[redacted]

General Information

Carbaryl is an insecticide with uses on a wide variety of terrestrial food and feed crops, as well as uses in turf management, ornamental production, and residential settings. There are currently three active technical registrants of carbaryl with 65 active product labels (64 Section 3s and one Special Local Needs), which include formulated products and technical grade carbaryl [redacted] Carbaryl can be applied in liquid (*i.e.*, flowable concentrate, emulsifiable concentrate, wettable powder, water soluble powder), granular, or dust forms. Aerial and ground application methods are allowed, as are pressure sprayers, dust applicators, spreaders and shank applicators, and baits [redacted]

Carbaryl enters the environment via direct application to use sites. It may move off-site via spray drift and runoff. Major routes of carbaryl transformation in the environment include alkaline hydrolysis, photolysis in water, and soil and aerobic aquatic metabolism. Abiotic hydrolysis under acidic conditions and anaerobic metabolism do not seem to play a significant role in the degradation and dissipation processes. Information on leaching and adsorption/desorption indicate that carbaryl is considered moderately mobile according to Food and Agricultural Organization (FAO) mobility classification system.

Low octanol/water partition coefficient (log K_{ow} 2.36) suggests that the chemical will have a low tendency to accumulate in aquatic and terrestrial organisms. Carbaryl has no degradates that are considered residues of toxicological concern [redacted]

Carbaryl is an N-methylcarbamate insecticide. Carbamate insecticides act by inhibiting acetylcholinesterase, thereby reducing the degradation of the cholinergic neurotransmitter acetylcholine. As a result, intersynaptic concentrations of acetylcholine increase as the neurotransmitter accumulates leading to increased firing of the postsynaptic neurons which may lead to convulsions, paralysis, and death of an organism exposed to the chemical. Acetylcholinesterase inhibition is rapidly reversed in many taxa once exposure to an N-methylcarbamate insecticide has ended. Carbaryl is also used to thin fruit in orchards; its activity in the abscission of flower buds may be related to its structural similarity to plant auxins, such as α-naphthalene acetic acid. The effects of carbaryl have been studied extensively in many taxa, particularly in terrestrial invertebrates [redacted]

[redacted]

[1] Interim approaches and agreement: https://www.epa.gov/endangered-species/interim-approaches-pesticide-endangered-species-act-assessments-based-nas-report